X. *Of the Culture and Uſes of the* Son or Sun-*plant of* Hindoſtan, *with an Account of the manner of manufacturing the* Hindoſtan *Paper. By Lieutenant Colonel* Ironſide. *Communicated by Dr.* Heberden *.

Redde, Dec. 23, 1773. THIS uſeful plant, I believe, is cultivated all over Hindoſtan. The ſeeds are ſown in July, before the rains begin; they ſhould be ſown near to one another, to make the ſtem riſe higher, more erect, with fewer branches, and to encreaſe the produce. It flowers in October, and is taken up in December.

The black ladies uſe the ſeeds, reduced to powder and mixed with oil, for their hair, upon a ſuppoſition, that this compoſition will make their hair grow to a great length, which they are very fond off.

From the bark are made all kinds of rope, packing cloths, nets, &c. and from theſe, when old, moſt of the paper, in this country, is prepared; for

* This Plant is deſcribed by Linnæus, under the name of Crotalaria juncea, vid. Spec. Plant. 1004. A figure of it is given by Ehret in Trews Plant. Select. t. 47. and another in the Hort. Malab. 9. p. 47. t. 26. Both theſe figures are good.

theſe purpoſes, the freſh plant is ſteeped four days in water, afterwards dried, and treated as the cannabis for hemp, to which it is ſo ſimilar when prepared, that Europeans generally ſuppoſe it to be the produce of the ſame plant.

As the ſubſtances, producing cloths, ropes, and paper, are few in preſent uſe, this plant may perhaps be cultivated with advantage, in ſome of the Britiſh Weſt India ſettlements, and in other countries deſtitute of hemp and flax. It is not improbable, that it may be raiſed in the warmer climates of Europe, as it ripens here in winter. I cannot ſay, what ſoils it may refuſe; where I have ſeen it, in the greateſt plenty and perfection, has generally been upon an earth compoſed of clay, calcareous grit, and ſand.

There are other vegetable ſubſtances uſed here for the purpoſe of rope making; one of them is a ſpecies of the hibiſcus, a deſcription of which I propoſe for the ſubject of another paper: I can ſcarce doubt, but that it is only for want of experiments, we have not a greater number of vegetables rendered uſeful in this manner. The claſs *Monadelphia*, of LINNÆUS, promiſes fair for trials of this kind.

The Hindoſtan method of manufacturing Paper.

The manufacturer purchaſes old ropes, cloths, and nets, made from the ſun plant, and cuts them into ſmall pieces, macerates them in water, for a few days, generally five, waſhes them in the river in a baſket, and throws them into a jar of water

lodged

lodged in the ground; the water is ſtrongly impregnated with a lixivium of ſedgi mutti * ſix parts and quick lime ſeven parts. After remaining in this ſtate eight or ten days, they are again waſhed, and while wet, broken into fibres, by the ſtamping lever, Fig. 1. [TAB. VII.] and then expoſed to the ſun, upon a clean terraſs, built for this purpoſe; after which, they are again ſteeped, in a freſh lixivium, as before. When they have undergone three operations of this kind, they are fit for making coarſe brown paper; after ſeven or eight operations, they are prepared for making paper, of a tolerable whiteneſs.

The rags, thus prepared, are mixed with water in the ciſtern, Fig. 2. at the edge of which the operator ſits, and removing the ſtick, he extends the ſcreen, Fig. 3. upon the frame, Fig. 4. with which he agitates the water in the ciſtern, until it appears of a milky whiteneſs, by the floating particles of the rags; he then dips the frame and ſcreen, in a perpendicular manner, and raiſes them gently, in a horizontal poſition, to the ſurface of the water, where he gives the frame a gentle motion, from ſide to ſide, or from end to end, to make the particles of the rags fall in an equal layer upon the ſcreen, and then he lifts them out of the water, and reſts them for the ſpace of a minute upon the ſtick 3, in Fig. 3. After repeating the dip once more in the ſame manner, the new ſheet

* Sedgi Mutti is an earth, containing a large portion of foſſil alkali. The νατρον of the antients. It is found in great plenty in this country, and univerſally uſed in waſhing, bleaching, ſoap-making, and for various other purpoſes.

of

of paper is formed; then, taking off the extenſors, BB, of the ſcreen, he rolls inwards, for about an inch, the upper part of the ſcreen and ſheet, by which means, ſo much of the ſheet will be ſeparated from the ſcreen; the ſcreen is then inverted, and the already ſeparated end of the paper is laid upon the mat, in Fig. 5, and the ſcreen is gently raiſed from the paper.—In this manner he forms ſheet after ſheet, until he has made 250, his day's taſk, laying them all upon the firſt ſheet, in a regular manner; then he covers the whole with a coarſe cloth of the ſun-plant, equal in ſize with the paper; above this he lays a thick plank, ſomewhat larger than the paper. This, by its weight, preſſes out the water from the wet ſheets; to aſſiſt which, the operator ſits upon it for ſome time. Then the heap is ſet to one ſide until morning, when the ſheets are taken up, one by one, and ſpread with the bruſh, Fig. 6, upon the clean plaſtered walls of the houſe; as they dry, they readily peel off, and are ſpread upon a clean mat or cloth, and with a piece of blanket, dipped in thin rice paſte water, rubbed all over, and immediately hung up, to dry, upon ſtrings run acroſs the houſe for this purpoſe. When ſufficiently dried, they are cut into a quadrangular form, according to a ſtandard ſheet, which ſerves as a guide to the knife, Fig. 7. From this operation, they are carried to another perſon, who rubs every ſheet ſmooth with a globular piece of moorſtone granite, which he holds in both hands. Then he folds the ſheets for ſale. The finer paper is poliſhed a ſecond time. All the cuttings, and damaged

ſheets

ſheets, are trampled to pieces in water, and renovated as above.

Inſtruments uſed in making the paper. TAB. VII.

Fig 1ſt. *a.* A ſtamping lever, ten feet long, and ſeven inches ſquared timber.

b. Two pieces of wood, fixed in the floor, to ſupport the axis of the lever.

c. This end of the lever is preſſed down by the feet of two men.

d. Is a ſtick, ſuſpended from the roof of the houſe, to which are faſtened four ropes which ſupport the arms of the workmen.

e. The head of the ſtamper four feet long, and four inches ſquared timber, bound and ſhod at the point with iron.

ff. A perpendicular ſection of a terraſſed ciſtern, dug in the ground-floor about 4 or 5 feet ſquare.

gg. A ſquare ſtone, in the bottom of the ciſtern, excavated in the middle, to receive the head of the ſtamper, by which the rags are beat to pieces. A perſon is ſtationed in the ciſtern, to ſupply the ſtamper with rags.

Fig. 2d. 1. 1. A terraſſed ciſtern, dug in the floor, 4 or 5 feet ſquare, having two little eminences,

2. 2. at the edge, to ſupport the ſtick

3. occaſionally.

4. A jar, lodged in the floor, to hold in readineſs the prepared rags.

Fig.

Fig. 3d. Is made in the manner of the Chineſe bamboo window-ſcreens. The tranſverſe lines are fine ruſh, or a graſs, neatly bound with horſe hairs, which makes the longitudinal lines.

A A. Two ſticks, to which the ſcreen is faſtened, and extended by the two ſticks,

B B. occaſionally.

Fig. 4th. A form of wood, with ſeven bars, to ſupport the ſcreen, Fig. 3d. The bars are ſo fixed, as that their acute edges only touch the ſcreen, that there may be no obſtruction to the paſſage of water through the ſcreen.

Fig. 5th. *a a.* Is a terraſs, 4 or 5 feet ſquare, inclined a few inches, that water may readily run from it.

b b. A mat or board laid upon the terraſs.

c. The new formed ſheet of paper laid upon the mat.

Fig. 6th. A flat hair bruſh for ſpreading the wet paper upon the walls of the houſe.

Fig. 7th. The double edged knife with which the paper is cut into a proper form.

Instruments used in making Hindostan Paper.

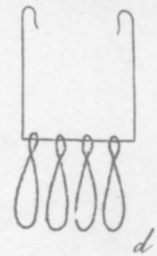


Fig. 1.

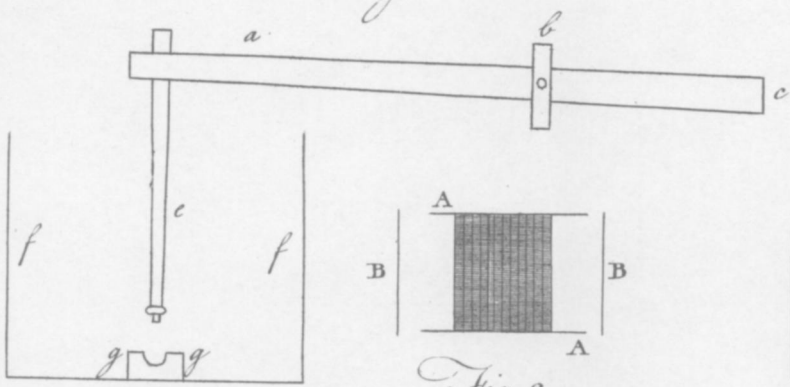
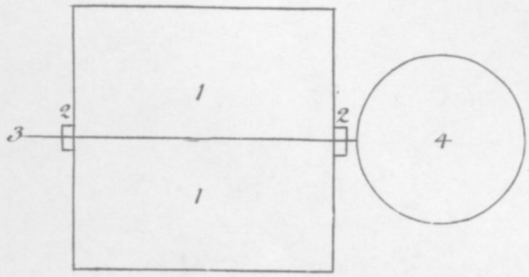


Fig. 3.

Fig. 4.

Fig. 2.



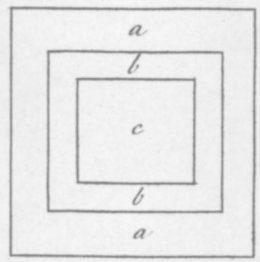


Fig. 5.

Fig. 6.

Fig. 7.